

PETITION

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Your Petitioners, James White and Greg Johannesen, citizens of the United States of America and residents of the State of Nebraska, whose residence and mailing address for James White is 1800 Wilderness Woods Place, Lincoln, Nebraska 68512 and for Greg Johannesen is 1800 Wilderness Woods Place, Lincoln, Nebraska 68512, pray that Letters Patent Protection be granted to them for a

GOLF CLUB FITTING SYSTEM

as set forth in the following specification:

Cross-Reference to Related Provisional Application

This application claims priority to the filing date of related provisional patent application serial No. 60/441,549 filed January 21, 2003.

Background of the Invention

1. Technical Field

The present invention relates to systems for custom fitting of golf clubs to players and, more particularly, to a golf club fitting system in which club deadweight and balance are matched to each player's physical strength level, flexibility, and swing type, the clubs within the player's set are weight and balance matched for more consistent on-course performance, the ability to perform test hitting on an adjustable lie-board which is adjusted to the playing position of the desired fitting club thus eliminating the use of innumerable test clubs with different lie angles and enabling determination of exact lie angle specifications and that

1 the test clubs used in connection with the system of the present
2 invention are adjustable both in length and head weight to
3 determine the unique and correct fitting specifications for each
4 user of the system.

6 **2. Description of the Prior Art**

7 The golf equipment industry continues to make quantum leaps in
8 club design and construction materials, with millions upon millions
9 of dollars being poured into advertising of the new technology and
10 further research and development to come up with even more
11 technological advances, all to try to gain an edge in the highly
12 competitive marketplace. While companies have adopted a wide
13 variety of design and performance concepts, one area which has
14 become of primary importance is effective club fitting and the
15 improvement of custom club building capabilities. However, the
16 advances in club design have not been matched by similar advances
17 in club fitting, particularly in the areas of comprehensive
18 information, economics and simplicity of the fitting process.
19 There is therefore a need for a club fitting system which is
20 efficient, accurate and cost-effective to permit the widest use
21 of the system.

22 Even though there are numerous configurations of fitting
23 systems in use today, there are several very important issues
24 which remain unaddressed and unsolved. While most reputable club
25 fitting systems address the more common fitting specifications in
26 some fashion or another, including shaft flex, shaft length, grip
27 size, lie angle and loft, there is no single system which
28 addresses these specifications and also addresses club weight and

1 club balance as they relate to player physical strength and swing
2 types to prepare a truly matched set of clubs for each player.
3 There is therefore a need for a golf club fitting system which
4 will address many different significant specifications during the
5 fitting process, yet will do so in a relatively simple and
6 straightforward manner to permit use of the system by fitters with
7 only a moderate amount of training.

8 Therefore, an object of the present invention is to provide
9 an improved golf club fitting system.

10 Another object of the present invention is to provide an
11 improved golf club fitting system in which the player's grip
12 strength is tested to determine the proper dead weight of the golf
13 club to be used, the selected golf club is measured to determine
14 the swing weight of the selected golf club, the balance index is
15 determined by dividing the dead weight by the swing weight, and
16 the proper club set selection is determined by graphing the
17 balance index versus the dead weight to find each club for use by
18 the player.

19 Another object of the present invention is to provide an
20 improved golf club fitting system which includes an adjustable lie
21 board and the use of marking tape on the club head which will
22 determine the proper fitting of the test club and moreover, that
23 the use of the adjustable lie board will permit the use of a
24 single test club during the fitting process, with angle changes
25 being made via the adjustable lie board instead of through the use
26 of multiple test clubs with slightly different club head angles.

27 Another object of the present invention is to provide an
28 improved golf club fitting system which includes significant

1 player interviews for gathering of information regarding preferred
2 clubs, playing capabilities and strengths and weaknesses in order
3 to permit the user of the present invention to make minor
4 adjustments to the specific club set dictated by the numbers set
5 forth by use of the present fitting system.

6 Another object of the present invention is to provide an
7 improved golf club fitting system which is usable with only a
8 small amount of training so that the proper use of the system is
9 generally guaranteed regardless of the experience of the user.

10 Finally, an object of the present invention is to provide an
11 improved golf club fitting system which is relatively simple and
12 inexpensive to manufacture and is intuitive, safe, effective, and
13 accurate in use.

Summary of the Invention

The present invention provides an improved golf club fitting system for fitting a set of golf clubs to a player includes the steps of measuring a player's physical dimensions at least including grip strength of the player's hand and selecting a representative golf club having a dead weight equal to the total weight of the representative golf club, said dead weight being directly proportional to the player's grip strength, specifically that the dead weight of the golf club is greater when the player's grip strength is greater and vice versa. The club length of the representative golf club is then recorded and the swing weight of the representative golf club is determined by standard testing procedures commonly used in the golf club industry. A balance index (BI) for the representative golf club is then computed by dividing the dead weight (DW) by the swing weight (SW) ($DW/SW = BI$) and the balance index (BI) determined for the representative golf club is compared to the dead weight of the representative golf club to determine generally corresponding balance index and dead weight values for at least some of the other golf clubs in a set of golf clubs such that the system user can generally match different iron and wood golf clubs to the representative golf club thereby creating a generally ideal matched set of golf clubs for the player.

It is clear that the features of this invention combine to form an easily useable and accurate improved golf club fitting system for use with players of virtually any skill and experience level. For example, a user of the present invention can quickly and easily learn the basic fitting elements of the system, thus

1 helping to prevent improper usage of the system due to inadequate
2 training. Furthermore, the test golf club provides numerous
3 advantages over other such test golf clubs, as the length and
4 weight of the club can be quickly and easily adjusted to obtain
5 the preferred length and weight for the player without requiring
6 use of multiple test clubs, which can severely degrade the
7 accuracy of the fitting process. Also, the Balance Index is
8 heretofore unknown in the prior art yet it has been found that the
9 swing weight divided by the dead weight of the club provides an
10 extremely useful baseline measurement, one on which, in fact, the
11 specifications for the entire club set can be based. Finally, the
12 adjustable lie board allows the fitter and the player to
13 effectively change the angle of the ground off which the player
14 is hitting, thus eliminating the need for the player to use
15 multiple test clubs during the fitting process and enabling far
16 more accurate measurements to be made during the process. It is
17 thus seen that the present invention provides a substantial
18 improvement over those fitting systems found in the prior art.

1 **Brief Description of the Drawings**

2 Figure 1 is a perspective view of the club head weights and
3 shaft length extension display plate to be used;

4 Figure 2 is perspective view of a test club fitted with the
5 shaft extensions and weights of the display plate;

6 Figure 3 is a perspective view of the adjustable lie board to
7 be used with the present invention;

8 Figure 4 is an end elevational view of the adjustable lie
9 board being used to fit a club thereon; and

10 Appendix "A" includes representative charts used with the
11 golf club fitting system of the present invention.

1 **Description of the Preferred Embodiment**

2 The golf club fitting system of the present invention is
3 designed to provide a relatively easy to use fitting system which
4 is powerful in its informational and accuracy capabilities. The
5 preferred method of the present invention is intended to
6 accomplish the proper fitting of clubs to player through the use
7 of four key elements. These are as follow:

- 8 1. Club deadweight and balance are matched to each player's
9 physical strength level, flexibility, and swing type;
- 10 2. The clubs within the player's set are weight and balance
11 matched for more consistent on-course performance;
- 12 3. The capability to perform test hitting on an adjustable lie-
13 board which is adjusted to the playing position of the
14 desired fitting club thus eliminating the use of innumerable
15 test clubs with different lie angles and enabling
16 determination of exact lie angle specifications; and
- 17 4. The test clubs used in connection with the system of the
18 present invention are adjustable both in length and head
19 weight to determine the unique and correct fitting
20 specifications for each user of the system.

21 To utilize and achieve these elements, the golf club fitting
22 system of the present invention contemplates the following
23 preferred step-by-step procedure for fitting, variations of which
24 will be discussed following this description of the procedure.

25
26 **GOLF CLUB FITTING SYSTEM OF THE PRESENT INVENTION**

27 **Step I - Collection of Personal Information**

28 A. Communication with the player

- 1 • Get the player relaxed, yet excited about the fit.
- 2 Briefly explain the process and equipment used.
- 3 B. Player profile (collection of information)
- 4 • Physical limitations.
- 5 • Right/left hand player?
- 6 • Current playing ability.
- 7 • Participation: Current playing and practice time.
- 8 • Player's interpretation of their game.
- 9 ▸ Strong points.
- 10 ▸ Weak points.
- 11 ▸ Confidence level.
- 12 • Current shot tendencies.
- 13 • Player's goals for their game and the fitting session.
- 14 C. Current equipment
- 15 • Irons.
- 16 • Woods.
- 17 • Custom fit?
- 18 • Player's likes/dislikes on club aesthetics and feel.
- 19 • Record specifications on selected clubs and favorites.
- 20 • Club length, shaft frequency and corresponding flex on
- 21 the appropriate CPM chart.
- 22 • Record dead weight (in ounces), swing weight (numeric
- 23 value), and balance index, computed by the following
- 24 formula, dead weight divided by swing weight = balance
- 25 index (DW/SW = BI).

27 **Step II - THE WARM-UP**

28 **A. Flexibility test**

- Use appropriate tests and assess potential problem areas.
- Record results as one of the following: **N** (no adj. needed), or **±** (excessive), or **=** (limited) adjustment factor for the final grip strength value.
- Discuss any concerns and recommendations with the player.

B. *Stretching out and getting focused*

- Get the player adequately loosened up before recording any hitting information.
- Get the player comfortable with the presence of the fitting equipment.

C. *Initial hitting*

- Use the player's own club first.
 - Use 6-iron for men.
 - Can use a 7 or 8-iron for women and refer to 6-iron on dead weight fitting chart 1-C.
 - Then go to the player's own driving club if fitting woods.
- After warm-up, have the player hit three (3) representative shots.
 - Record carry distance and club head speed for selected shots (successful) using the Distance Caddy. Observe ball flight tendencies.
- Observe ball flight tendencies and begin swing analysis.
 - Present posture and balance characteristics.
 - **Assess** needed changes.
 - Consider effect on results during the fit.

- ▶ Check gripping habits at top of grip as initial indicator on shaft length needs.
- ▶ Effect on player's balance.
- ▶ Effect on club length recommendation.
- Record any swing tempo and shaft loading adjustments needed: **N**, or **±** or **-**.
 - ▶ Quick pace = lighter dead weight (-).
 - ▶ Heavy loading = less dead weight (+).
- Swing speed and shaft flex.
 - ▶ Obtain average swing speed for 6-iron and/or driver.
 - ▶ Record preliminary shaft flex from chart #2.

Step III - STATIC MEASUREMENTS

A. Grip strength test with the dynamometer

- Set tester for player's hand-size.
- Player holds tester with arm in handshake position.
- Take test with each hand, record and average.
- Consider flexibility, swing tempo and shaft loading adjustments and record final average.

B. Grip size

- Measure middle finger length.
- Measure palm to wrist-crease length.
- Evaluate grip type, whether palm or finger dominant.
- Refer to chart #3 for recommendation.
- Give consideration to current grip size and effects if changed.

C. Club shaft length

- 1 • Record the player's height.
- 2 • Record ground-to-palm/knuckle of longest finger for both
- 3 sides with the player standing tall with shoulders
- 4 relaxed, down and level and arms hanging down at sides.
- 5 • Average the two measurements (L-S).
- 6 • With the player in address position with current 6-iron,
- 7 measure ground to middle finger palm/knuckle on the
- 8 target side of player to determine drop (L-A).
- 9 • Record preliminary length from chart #4, but also
- 10 include the following considerations:
- 11
 - 11 ▸ Any posture changes needed;
 - 12 ▸ Current playing ability;
 - 13 ▸ Player's flexibility, body-size and age.

14 **D. Club deadweight and balance**

- 15 • Refer to chart #1-A for initial 6-iron deadweight and
- 16 balance figures and record as preliminary. (Use proper
- 17 club length line.)
- 18 • Refer to chart #1-B for driver reference.
- 19 • To calculate swing weight from chart #1: Use dead
- 20 weight divided by the balance index.
- 21 • To calculate dead weight for club: Use swing weight
- 22 (numeric) multiplied by the balance index.

24 **Step IV - TEST CLUB CONFIGURATION**

25 **A. Select proper club dead weight**

- 26 • Consider head weights available in the desired styles.
- 27 • Determine best club head/shaft configuration
- 28 considering:

- ▶ Recommended shaft length from fitting chart #4.
- ▶ Shaft material options available.
- ▶ Needed adjustments due to flexibility, swing tempo, and shaft loading effects, all previously recorded.
- ▶ Consider any potential additional grip weight due to size recommendations.

B. Calculate best club balance and adjust head weight of test club:

- Consider above parameters and effects on preliminary balance recommendations.
- Assess amount of change in balance needed from present clubs.
- Factor in present ball flight tendencies and effects of head-light vs. head-heavy balance (draw/fade).

C. Determine best shaft flex and torque characteristics factoring in:

- Swing speed test results.
- Transition tempo and shaft loading.
- Recommended playing length and effect on final flex.
- Shot trajectory tendencies.

D. Set the proper test club length using the adjustable grip length extensions provided on the display board as shown best in Figures 1 and 2.

Step V - TEST CLUB HITTING

- A. All test hitting must be done "blind" to the player.**
- B. Hit 3 representative shots with each of 3-5 test clubs with short tee.**

- Record the head weight setting with each test club used.
- Record the carry distance and club head speed on selected shots.
 - Give primary consideration to the 2nd and 3rd shot with each test club.
 - Observe ball flight and trajectory tendencies.
 - Listen for best sound at impact for proper shaft flex.
 - Ask for player's impressions of each club likes/dislikes and any apparent "feel" differences.

C. *Dynamic lie angle test.*

- Use proper test club at the recommended length and flex.
- Place tape on club sole and hit 1 to 2 shots off of the adjustable lie board, shown best in Figures 3 and 4.
- Note position of impact mark on tape and make the necessary lie board adjustment and repeat this process until the contact mark is centered on the sole in relation to the heel/toe of the club head.

Step VI - FINAL ANALYSIS

- A. *Compare results from test clubs hit, including player's own club.***
- B. *On a one-shot basis, alternate the best test club with other clubs in the player's set for compatibility and consistent performance.***
- C. *Record final fitting specifications.***
- D. *Determine the best club set make-up for the player.***

END OF SYSTEM

1 The golf club fitting system of the present invention makes
2 reference to numerous fitting charts and graphs, each of which are
3 included in the attached "Appendix 'A'". Although the charts are
4 generally self-explanatory, it should be noted that the important
5 steps of plotting the preferred dead weight and swing weight ratio
6 as the balance ratio will determine to a great extent the nature
7 of the club set. For example, a player would come in to the
8 fitter and as part of the fitting process, the fitter would ask
9 the player what is his or her current favorite club in their
10 present set, if one exists. Using the player's specific favorite
11 club as a guideline, the club dead weight is divided by the swing
12 weight to get the balance index ($DW/SW = BI$), which will permit
13 the fitter to calculate the approximate dead weights and swing
14 weights and hence the balance indexes for the remaining clubs in
15 the desired set. The remaining fitting process, though involved
16 and incorporating much information, can be greatly accelerated due
17 to the narrowing of scope of acceptable club choices by evaluating
18 a player's favorite club. Of course, it should be noted that
19 evaluating a player's favorite club is only one element of the
20 system of the present invention, yet one which will provide much
21 assistance in determining the final fitting specifications.

22 Versatility, affordability, and convenience are all important
23 attributes of the golf club fitting system of the present
24 invention. Further, when these features are combined with the
25 accurate and powerful fitting information obtained for each
26 individual player, the fitting results produced by this system are
27 superior to those found in the prior art and will result in the
28 development of a network of astute club fitters and a multitude

1 of better performing customers.

2 The golf club fitting system of the present invention was
3 created out of a desire for obtaining improved fitting information
4 to facilitate the process of getting performance-enhancing golf
5 equipment in the hands of players of all skill levels from
6 beginner to professional. Although the fitting system of the
7 present invention was initially designed to focus on a player's
8 set of irons, it has been easily and quickly adapted to use with
9 the fitting of driver and fairway woods thus bringing the fitting
10 system of the present invention to its present form. Further
11 developments contemplated and included as elements of the present
12 invention will include the development of fully adjustable test
13 clubs in drivers, fairway woods, utility clubs (hybrids), wedges,
14 and putters, in addition to the irons currently developed for use
15 with the present invention. These additions increase the
16 versatility of this system and provide the fitter with enhanced
17 ability to accurately match any individual club to the rest of a
18 player's set. This is accomplished through both diagnostic work
19 and the additional important aspect of being able to test hit
20 actual clubs with the desired fitting specifications applied.

21 Additional features of the present invention are shown in
22 Figures **1-4**, and include the display board **10** of the present
23 invention which is shown best in Figures **1** and **2** as including a
24 planar support board **12** which includes a plurality of shaft
25 extension support holes **14** and a plurality of head weight support
26 holes **16** formed therein for supporting and displaying the shaft
27 extensions **18** and head weights **20** respectively. As shown best in
28 Figure **2**, the shaft extensions **18** are designed to screw into the

1 top end of the grip **56** of the test club **50** and the head weights
2 **20** are designed to be screwed into the club head **52** mounted on the
3 shaft **54** of the test club **50**. In the preferred embodiment, the
4 shaft extensions **18** would be made in a series of progressively
5 lengthened units, i.e. the one-inch extension, the one and one-
6 half inch extension, etc. Likewise, the head weights would be
7 made in progressively heavier units, i.e. the $\frac{1}{4}$ ounce weight, the
8 $\frac{1}{2}$ ounce weight, etc. In this manner, the precise weight and
9 shaft length for the test club **50** can be set so that the player
10 and fitter can determine the best fitting club for the player and
11 use the resulting figures to fit the rest of the desired set.

12 The adjustable lie board **100** of the present invention is
13 shown best in Figures **3** and **4** as including a base plate **102** on
14 which is mounted a lie plate stand **104** which in the preferred
15 embodiment would be a pair of upright support columns. Pivotably
16 mounted on the lie plate stand **104** is the lie plate **110**, which,
17 in the preferred embodiment, would be a metal plate which pivots
18 along a generally horizontal line in a "see-saw" motion. The
19 pivoting of the lie plate **110** is controlled by a threaded screw
20 **106** which extends or retracts depending on the rotation of the
21 screw **106** thus raising or lowering one side of the lie plate **110**
22 and thus changing the angle of the lie plate **110** relative to the
23 base plate **102**. The angle readout device **108** permits quick and
24 accurate reading of the angle of the lie plate **110** which will
25 assist the fitter in the setting of the club head **52** to the
26 correct angle relative to the club shaft **50** for the player's
27 swing. The use of tape **200** on the club head **52** will determine the
28 proper fitting of the test club **50** and moreover, the use of the

adjustable lie board 100 permits the use of a single test club 50 during the fitting process, with angle changes being made via the adjustable lie board 100 instead of through the use of multiple test clubs with slightly different club head angles. The present invention thus provides even further streamlining of the fitting process and a further improvement over the prior art fitting systems.

Two other areas in this fitting system are also in the development stage at this time, yet are contemplated as elements of the present invention and disclosure. One, the grip on the adjustable test clubs is currently adjustable by insertion and removal of a short section of grip is attached to each shaft extension plug, as shown in Figures 1 and 2. A new system of full length, removable grips in varying sizes and weights is being developed to provide improved club balance and feel to promote even more accurate test results. This will allow the fitter to not only set up a test club with the proper dead weight, balance, shaft flex, and length, but also the proper grip size in the actual weight category recommended, resulting in very exacting specifications for the club which is to be tested. Two, as a main priority in the development of this fitting system was to keep it very user friendly as compared to those systems found in the prior art, simplification of procedures is an ongoing concern. As an element of this ongoing process, a swing weight scale is being finalized which will allow the fitter to compare the balance of over or under length clubs to the balance (feel) of a standard length club with traditional lorythmic swing weight readings taken directly from the scale (i.e.. as shown in the accompanying charts

1 in Appendix "A"). No chart conversions would be necessary to
2 determine, for example how a one inch over length club would feel
3 in balance compared to a standard length club, which will further
4 streamline the golf club fitting system of the present invention.

5 It is to be understood that numerous modifications, additions
6 and substitutions may be made to the present invention which fall
7 within the intended broad scope of the above disclosure. For
8 example, although the steps of the present invention have been
9 described with some particularity, the order and specific tests
10 performed may be modified so long as the necessary information to
11 enable proper functioning of the golf club fitting system of the
12 present invention is retrieved by appropriate means. Also, the
13 precise size, shape and dimensions of the elements of the present
14 invention, including the fitting display plate and the adjustable
15 lie board, may be modified or changed so long as the intended
16 functionality of the present invention is not modified or
17 destroyed. Finally, the precise figures and calculations used
18 during use of the golf club fitting system of the present
19 invention are critical to the present invention only so far as
20 they permit interpretation of raw data taken from the player to
21 connect the player to the right equipment for him or her to use,
22 thus improving his or her game and thus their enjoyment. It is
23 a key feature of the present invention that the golf club fitting
24 system is designed to adapt to the player's and the fitter's needs
25 and not force adaptation by the player and fitter to the system.
26 This degree of flexibility and ability of the system to adapt to
27 those changing needs sets the present invention apart from those
28 fitting systems found in the prior art.

1 There has therefore been shown and described a golf club
2 fitting system which accomplishes at least all of its intended
3 purposes.
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